

In the Specification:

Please replace paragraph [0075] with the following amended paragraph:

[0075] Again, the precise positional assembly of individual dopant atoms can be achieved by proximity probe manipulation of individual atoms at low temperatures; low voltage ion implantation; directed assembly, surface assisted assembly, and self-assembly methods, and other methods. Typical positional placement precision requirements are approximately a nm . However, the positional placement precision requirements will be determined by the performance tolerance specified for each device. The fixing of the atomic positions of dopants and suppression of their movement can be accomplished by topography or surface driven segregation of dopants and/or surface passivation, electron-irradiation modification of materials properties, or the use of porous materials with controlled shape and distribution of pores, such as porous polymers, porous diamond, and porous calcium fluoride. For example, to construct the horizontal structures shown in FIG. 22, molecular beam epitaxy, MBE, can be used to build up a specified thickness of host material of a silicon lattice. Maskless patterning methods, such as probe lithography, directed assembly such as previously discussed with respect to aluminum atoms on silicon, or low-energy single-ion implantation can be used to position individual dopant atoms at precise locations on the silicon surface. With respect to single-ion implantation techniques, see T. Schenkel et al., "Single ion implantation for solid state quantum computer development," *Journal of Vacuum Science and Technology B*, 20 (2002) 2819, which is incorporated herein by reference. As described above, MBE continues to build up the thickness of the silicon lattice and embed the dopants at precise locations within this structure. Conventional, holographic or imprint patterning meth-

ods can be used to define regions to etch, for isolating individual channel structures. Alternatively, the final etch, a subtractive process, can be eliminated if an MBE resistant region is defined lithographically prior to the first step, described above.